CLAIMS

1. A method of improving visual function of a damaged retina in a human eye, the method comprising:

applying electrical stimulation to the eye with a source of electrical stimulation to improve visual function of the damaged retina, wherein applying electrical stimulation improves visual function of at least one structure of the damaged retina not in contact with the source of electrical stimulation.

2. The method of claim 1, wherein the improved visual function comprises at least one of improved perception of light in the presence of light, and improved perception of darkness in the presence of darkness, improved perception of contrast, color, shape, resolution, movement and visual field size.

3. The method of claim 1, wherein the source of electrical stimulation comprises at least one device in contact with any structure of the eye.

4. The method of claim 1, wherein the electrical stimulation is provided to at least one of the damaged retina and a structure of the eye.

5. The method of claim 3, wherein the at least one device is in contact with the damaged retina, and

the applying electrical stimulation improves the visual function of at least a structure of the damaged retina peripheral to a portion of the retina in contact with the at least one device.

6. The method of claim 3, wherein the at least one device comprises a plurality of devices.

7. The method of claim 3, wherein the at least one device comprises a RSD.

8. The method of claim 7, wherein the RSD comprises at least one silicon chip,

at least one stimulating electrode,

at least one ground return electrode, and

at least one photoelectric pixel.

9. The method of claim 8, wherein the at least one photoelectric pixel comprises at least one photodetector.

10. The method of claim 9, wherein the at least one photodetector pixel comprises at least one photoconductor.

11. The method of claim 10, wherein the at least one photoconductor comprises at least one photodiode.

12. The method of claim 8, wherein the RSD further comprises an electrical ground and an insulated conductor.

13. The method of claim 12, wherein the RSD further comprises a silicon tail.

14. The method of claim 13, wherein the silicon chip of the RSD comprises at least one fenestration.

15. The method of claim 14, wherein the at least one stimulating electrode comprises an anode or a cathode, and

wherein the at least one ground return electrode comprises an opposite polarity of the at least one stimulating electrode.

16. The method of claim 7, wherein the RSD is at least one device selected from the group consisting of SRP, SEMCP, ASR, ISEMCP, ISEMCP-C, VGMMRI and MMRI.

17. The method of claim 1, wherein the applying electrical stimulation is applied in response to light.

18. The method of claim 1, wherein the source of electrical stimulation comprises a device having at least one photoactive surface electrically connected to at least one stimulating electrode.

19. The method of claim 18, wherein the photoactive surface comprises at least one photodiode, photovoltaic device or photoelectric device.

20. The method of claim 19, wherein the at least one photodiode comprises a plurality of photodiodes, photovoltaic devices or photoelectric devices.

21. The method of claim 3, wherein the at least one device is implanted surgically into a subretinal space at an angle between about 5° and 80° off-axis from a macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of a pupil and an off-axis line extending from the device to the central structure of the pupil.

22. The method of claim 3, wherein the at least one device is surgically implanted in at least one area of the damaged retina, excluding a macula.

23. The method of claim 3, wherein the at least one device comprises at least one fenestration.

24. The method of claim 3, wherein the at least one device comprises an inductive receiver, a solar cell or a battery.

25. The method of claim 1, wherein the electrical stimulation comprises a voltage potential, V_p, of $-20V \leq V_p \leq +20$ V.

26. The method of claim 25, wherein the V_p is $-5V \leq V_p \leq +5$ V.

27. The method of claim 25, wherein the V_p is $-1V \leq V_p \leq +1$ V.

28. The method of claim 25, wherein said electrical stimulation is intermittent.

29. The method of claim 1, wherein the damaged retina is the result of at least one condition selected from the group consisting of age-related macular degeneration, retinitis pigmentosa, choroidal disease, choroidaremia, long-term retinal detachment, diabetic retinopathies, Stargardt's retinopathy, Leber's congenital amaurosis, Best's Disease, choroidal rupture, and choroidal diesease.

30. A method of treating visual degradation resulting from a damaged retina, wherein the visual degradation comprises primary or secondary degradation, the method comprising:

applying electrical stimulation to an eye containing the damaged retina with a source of electrical stimulation, wherein a portion of the damaged retina not in contact with the source of electrical stimulation is treated.

31. The method of claim 30, wherein the damaged retina comprises a damaged cell comprising a photoreceptor cell, choroidal vasculature cell, retinal pigment epithelial cell, bipolar cell, horizontal cell, amacrine cells or ganglion cells, and

wherein at least one portion of the damaged cell is treated.

32. The method of claim 31, wherein the at least one portion that is treated comprises at least one portion of an undamaged cell.

33. The method of claim 31, wherein the at least one portion that is treated comprises a portion not in physical contact with the source of electrical stimulation.

34. The method of any of claims 30-33, wherein the electrical stimulation is provided to at least one of a retina and a structure of the eye.

35. The method of claim 30, wherein the source of electrical stimulation comprises at least one device in contact with the eye.

36. The method of claim 35, wherein the at least one device is in contact with the retina, and the applying electrical stimulation treats at least a structure of the damaged retina peripheral to the portion of the retina in contact with the at least one device.

37. The method of claim 35, wherein the at least one device comprises a plurality of devices.

38. The method of claim 35, wherein the at least one device comprises a RSD.

39. The method of claim 36, wherein the RSD comprises at least one silicon chip,

at least one photoelectric device,

at least one stimulating electrode,

at least one ground return electrode, and

at least one pixel.

40. The method of claim 39, wherein the RSD further comprises an electrical ground and an insulated conductor.

41. The method of claim 40, wherein the RSD further comprises a silicon tail.

42. The method of claim 41, wherein the silicon chip of the RSD comprises at least one fenestration.

43. The method of claim 42, wherein the at least one stimulating electrode comprises an anode or a cathode, and

wherein the at least one ground return electrode comprises an opposite polarity of the at least one stimulating electrode.

44. The method of claim 38, wherein the RSD is at least one device selected from the group consisting of SRP, SEMCP, ASR, ISEMCP, ISEMCP-C, VGMMRI and MMRI.

45. The method of claim 30, wherein the applying electrical stimulation is applied in response to light.

46. The method of claim 30, wherein the source of electrical stimulation comprises a device having at least one photoactive surface electrically connected to at least one stimulating electrode.

47. The method of claim 46, wherein the at least one photoactive surface comprises at least one photodiode, photovoltaic device or photoelectric device.

48. The method of claim 47, wherein the at least one photoactive surface comprises a plurality of photodiodes, photovoltaic devices, or photoelectric devices.

49. The method of claim 35, wherein the at least one device is implanted surgically into a subretinal space at an angle between about 5° and 80° off-axis from a macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of a pupil, and an off-axis line extending from the device to the central structure of the pupil.

50. The method of claim 35, wherein the at least one device is surgically implanted in at least one area of the retina, excluding a macula.

51. The method of claim 35, wherein the at least one device comprises at least one fenestration.

52. The method of claim 35, wherein the at least one device comprises at least one inductive receiver, solar cell or battery.

53. The method of claim 30, wherein the electrical stimulation comprises a voltage potential, V_p, of $-20V \leq V_p \leq +20$ V.

54. The method of claim 53, wherein the V_p is $-5V \leq V_p \leq +5$ V.

55. The method of claim 53, wherein the V_p is $-1V \leq V_p \leq +1$ V.

56. The method of claim 53, wherein the electrical stimulation is intermittent.

57. The method of claim 30, wherein said damaged retina is the result of at least one condition selected from the group consisting of age-related macular degeneration, retinitis pigmentosa, choroidal disease, choroidaremia, long-term retinal detachment, diabetic retinopathies, Stargardt's retinopathy, Leber's congenital amaurosis, Best's Disease and choroidal rupture.

58. A method of improving visual function in a damaged macula of a human eye, the method comprising:

selecting at least one device configured to generate an electrical signal in response to exposure to a source of light, each of the at least one devices comprising at least one pixel; and

implanting the at least one device in a subretinal space in the eye, wherein the device is positioned peripheral to the macula of the eye and in the subretinal space.

59. The method of claim 58, wherein implanting the device comprises implanting the device at a position in the subretinal space at an angle between about 5° and 80° off-axis from the macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of the pupil and an off-axis line extending from the device to the central structure of the pupil.

60. The method of claim 58, wherein implanting the device further comprises implanting the device in a temporal half retina region of the eye.

61. The method of claim 58, wherein implanting the device further comprises implanting the device in a nasal half retina region of the eye.

62. The method of claim 58, wherein selecting at least one device comprises selecting a plurality of devices, and wherein implanting the at least one device comprises implanting the plurality of devices.

63. The method of claim 62, wherein implanting each of the plurality of devices comprises implanting each of the plurality of devices at a respective position in the subretinal space between about a 5° and an 80° angle off-axis from the macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of the pupil

and an off-axis line extending from the device to the central structure of the pupil.

64. The method of claim 62, wherein implanting the plurality of devices further comprises implanting the plurality of devices in a temporal region of the eye.

65. The method of claim 62, wherein implanting the plurality of devices further comprises implanting the plurality of devices in a nasal region of the eye.

66. The method of claim 62, wherein the plurality of devices are implanted symmetrically around a region centered by the macula.

67. A method of implanting a device in an eye of a patient having least one condition selected from the group consisting of outer neuroretina disease, choroidal disease and retinal epithelial disease, the method comprising:

implanting in a subretinal space in an eye of the patient having at least one device configured to generate an electrical signal in response to exposure to a source of light, the device comprising at least one pixel, wherein the device is positioned in one of a peripheral or mid-peripheral region in the subretinal space outside of a macula of the eye.

68. The method of claim 67, wherein implanting the device comprises implanting the device at a position in the subretinal space between about a 5° and an 80° angle off-axis from the macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of the pupil and an off-axis line extending from the device to the central structure of the pupil.

69. The method of claim 67, wherein implanting the device further comprises implanting the device in a temporal half retina region of the eye.

70. The method of claim 67, wherein implanting the device further comprises implanting the device in a nasal half retina region of the eye.

71. The method of claim 67, wherein the condition is selected from the group consisting of age-related macular degeneration, retinitis pigmentosa, choroidal disease, choroidaremia, long-term retinal detachment, diabetic retinopathies, Stargardt's retinopathy, Leber's congenital amaurosis, Best's Disease and choroidal rupture.

72. The method of claim 67, wherein selecting at least one device comprises selecting a plurality of devices, and wherein implanting the at least one device comprises implanting the plurality of devices.

73. The method of claim 67, wherein implanting each of the plurality of devices comprises implanting each of the plurality of devices at a respective position in the subretinal space between about a 5° and an 80° angle off-axis from the macula, wherein the angle is defined by an intersection of an axis line extending from the macula to a central structure of the pupil and an off-axis line extending from the device to the central structure of the pupil.

74. The method of claim 67, wherein implanting the plurality of devices further comprises implanting the plurality of devices in a temporal half retina region of the eye.

75. The method of claim 67, wherein implanting the plurality of devices further comprises implanting the plurality of devices in a nasal half retina region of the eye.

76. The method of claim 67, wherein the plurality of devices are implanted symmetrically around a region centered by the macula.

77. A method of implanting a device in a human eye, the method comprising:

implanting at least one device in at least one of a peripheral and mid-peripheral region in a subretinal space outside of a macula of the eye, wherein the at least one device is configured to generate an electrical current in response to exposure to a source of light,

the device comprising at least one photodetector,

and wherein the device is positioned away from a region of damaged retinal cells.